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MEMORANDUM

26 February 1960

TO:
STATINTL
FROM: [redacted]

SUBJECT: Photographic Rectifier

In conference today, suggestions were requested for extending applications of H-229 Photo Rectifier and for allied new developments. Herein are listed some possible products for development.

(1) Improved Rectifier

There is a market for higher speed, and higher precision rectifier with reduced resolution. Lower resolution (10-15 l/mm, satisfactory for mapping) and the elimination of scan retrace time will reduce the time for rectification of tracker film from 40 minutes to less than 1 minute. Additional advantages are less complicated equipment and simpler programming. This unit will handle 70 millimeter and 4-1/2" film with maximum lengths of 12-18 inches. The development cost of such an item should be somewhat less than that for the present rectifier.

(2) Reversible Rectifier

Optical rectifications are frequently based upon preliminary knowledge of three of more control points. It is desirable for an electronic rectifier to have the capability of reversing operation: that is to determine the rectifying transformation from film data and known control points by restricting the electronic rectifier to a specific type of transformation, that is oblique or panoramic. An electronic rectifier can be made to achieve this result. In spite of restricted transformation it would have a capability superior to that of present optical rectification.

It is also proposed that such a unit operate with reduced resolution and increased speed. This is primarily a mapping device. The cost of development would probably exceed that of the present model. This would largely be caused by the increased computer capacity.

(3) Patch Rectifier

High resolution rectified images are desired by the photo interpreter. He is concerned with object aspect ratios. Another version of a rectifier can be restricted to rectifying small areas of the negative. This device can rectify patches

1/4" square with resolution of 50 1/mm. This device will also operate on a video signal to accent detail contrast, enhance contours, selectively destroy or accent repetitive detail, and perform other types of image enhancement. The greatly simplified programming will not permit accurate placement for mapping. Considerable study and experiment can be made with this device to determine the nature of image data and methods of enhancing them.

(4) Navigation Aid

A photo map rectified on a hemisphere can provide valuable aid for navigation. Such map will provide the proper scale map for comparison for radar navigation. This project involves a large photo reduction effort. For instance, one 18" scale photograph would be reduced to 0.03" scale. Large mosaics would have to be produced and optically reduced, fitting to the sphere. The rectification equipment for printing the sphere is simple. Interim rectification may be done with standard rectifiers.

A hemispheric map would be viewed by the navigator through an enlarged microscope and a closed circuit television system by scanning the image in the same manner as the radar is scanned. A comparison of radar and photo data can be obtained. The image can be superimposed optically or electronically for map matching information.

(5) Rectifier Programming Study

There is a requirement for a rectifier having a wide capability in rectifier transforms and which does not require punch tape programming. This computer would be controlled by dial settings of camera focal length and other transformation characteristics. The immediate difficulty of such systems lies in the economy of incorporating a sizable computer function in the rectifier mechanism. The need is sufficiently urgent to perform a study which will define economic computer equipment for use in a rectifier which is not unreasonably limited in the range of rectifying transforms.

The preparation of maps for this purpose will be greatly simplified by satellite photography.

Further product items that require development though unrelated to the rectifier is also suggested.

(6) Data Recording

Improved methods of recording data on film is a continued and un-

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satisfied requirement. We can develop data recording equipment to print alphanumerically, such information as latitude, longitude, and other flight and exposure information on each photograph. This device would consist of lamp mosaic to illuminate letters and numbers sequentially. A lens translated across the film would record a sequence of characters containing desired information. A further desirable piece of information is the nadir point. This would also be recorded as accurately as the vertical vector can be known from a position gyro.

(7) Rapid Processor

For lower resolution rectifiers, the inclusion of a rapid processor would simplify the operation of the equipment, and insofar as it would reduce the number of steps required for the processor.

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